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LOST MOUNTAINS OF THE PRAIRIES

By CHARLES KEYES

DE MOINES, IA.

NOWHERE perhaps on the face of our globe does there exist a bit of landscape more picturesque, more unexpectedly novel, or more curiously wrought into strong contrasts of relief than that found about the point where meet the three great prairie states of Iowa, Minnesota and South Dakota. It is in the very midst of the Great Plains which stretch out unbrokenly from the Arctic ocean to the Mexican gulf. It is a part of that tract which early French explorers and *coureurs de bois* were pleased to call the Coteau des Prairies; and which an English trapper designated the Height of Land. For its size and altitude it is the most scenic spot on earth.

In this region are perfectly represented in miniature some of the grandest relief features of every clime: Grand Canyon of Arizona, the Royal Gorge of Colorado, the majestic escarpment of Glorietta, the pinnacled Dolomites of the Eastern Alps, the rock-walled lakes of northern Italy, the boiling rapids of Finnish Imatra, the leaping brooks of Norway, the broad water-curtain of Niagara, and about all the boundless Girghiz steppes. In days gone by also there covered this land glaciers compared with which existing ice-fields sink into utter insignificance. Formerly lofty volcanoes poured forth their floods of molten rock. Alone of all great landscape types mountains are missing. Once these too were here; but to-day they lie buried beneath the level of the singularly flattened and monotonous prairies.

At the present time there are, within the limits of the area of which we speak, few traces in any of the relief features to indicate that there ever existed here a high and mighty mountain range. The ground is perhaps a little higher than it is either to the east or to the west. The country to the north is indeed a low watershed. Plain is the dominant topographic expression of the entire region. In all directions the eye, has unobstructed view for distances of many miles. Even the horizon is unbroken by hill-form or valley depression; it is as straight as the sky-line at sea. Travelers at the railroad stations see afar a full half-hour before the train arrives the black smoke-cloud of the approaching locomotive.

Of the lofty mountains which once loomed up on the horizon every vestige at the surface has long since vanished. They are leveled to the sea, lost and forgotten. To-day their foundations are being slowly

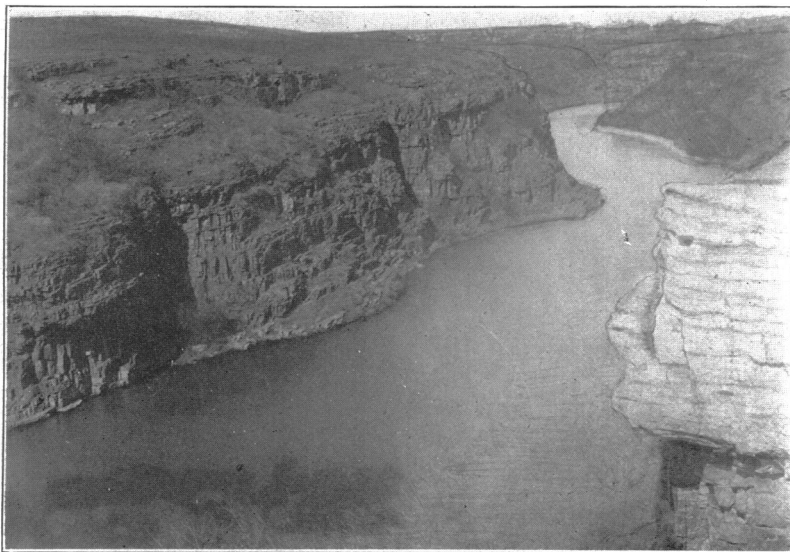


FIG. 1. CANYON OF THE SIOUX RIVER; a remarkable meeting of antithetical relief types.

exhumed by the corradng action of stream and rain; and here and there the old structures are being brought to sky. The traces are many but inconspicuous. Recently through means of the records of many deep-well borings and other data the height, extent and form of the



FIG. 2. DEPTHS OF THE SIOUX CANYON AT THE DELL RAPIDS.

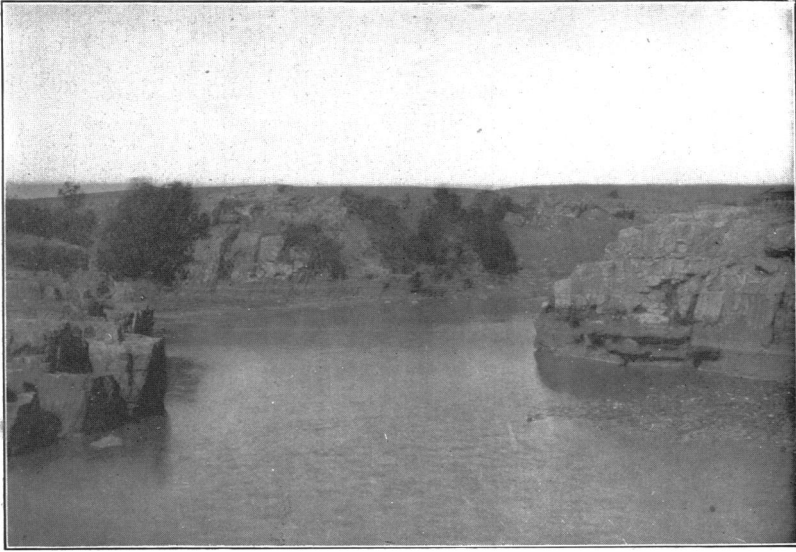


FIG. 3. JASPER POOL; an old canyon filled with glacial débris.

ancient mountain range has been fully figured forth, and its characteristic features pictured out. This great earth-wrinkle which sprang from the sea in Mesozoic times extended from the east shore of present Lake Superior southwestward beyond the path of the Missouri River. Medially the rocks were bowed up more than a mile above the existing level of the prairies. In their prime these Siouan mountains rivaled in scenic beauty and grandeur the Adirondacks, the southern Appalachians or the Juras of to-day. Then Jove and Boreas and Vulcan each laid claim to them; and each did his work of demolition quickly and well. They reduced the majestic pile of adamantine down to the very level of the ocean, when Neptune gathered it to his own.

Although now no remnant of former mountains remains in the relief expression of the region and the entire area of once high altitudes is as level and as smooth as any other part of the vast interior plain there persists beneath the glacial mantle mountain structures as well pronounced and as typical as they are anywhere else in the world. The broadly arched strata, the folded formations, the faulted rocks, the intrusions of once molten magmas, the prodigious extravasations of volcanoes, are familiar features which here are characteristically developed. The evidences of orogenic uprisings are unmistakable. Seldom to the geologist are mountain phenomena more clearly depicted. Form, extent and stratal attitude are measurable with great precision.

The discovery of the old and long-buried mountain range is a matter so recent and so instructive that a brief statement of the manner of its finding is not without distinct interest. It well illustrates the

method of modern scientific venture beyond the confines of the known. By peeling off, as it were, the thick Cretacic and glacial coverings of the area the entire Mesozoic floor is laid bare, and the Paleozoic formations then constitute the uninterrupted bed-rock of the whole region. By what is essentially the same thing elimination of these later coverings is accomplished by plotting the numerous deep-well records and other data relating to the underground structures.

Casually referring to a general geological map of the area, the various Paleozoic terranes are seen to be distributed in relatively narrow belts trending in a northwest direction. Singularly these belts in southern Minnesota abruptly terminate. The cause has been long perfectly inexplicable. It is now found that the most ancient rocks form the core of a rather notable arch, the axis of which is directed northeastwardly. It is a true anticline structure of large proportions and great longitudinal extent. After the country had been bowed up it was planed off quite to sea-level. It is against this anticline that the belted Paleozoics are upturned and cut off. Indeed, they too once extended unbrokenly over the old arch. In northern Minnesota and in Manitoba the same belted formations abruptly appear again. The discovery is a result of inductive reasoning that is quite remarkable. The whole problem was in fact fully worked out before its proofs were even sought in the field. Lines of reasoning and results of extensive direct observation are in strictest accord. Discovery was made before the facts themselves were even presented.

Rarely in so small compass is there so well displayed the effects of every great geologic process known. For countless ages fire, flood and frost have played upon these rocks without completely effacing

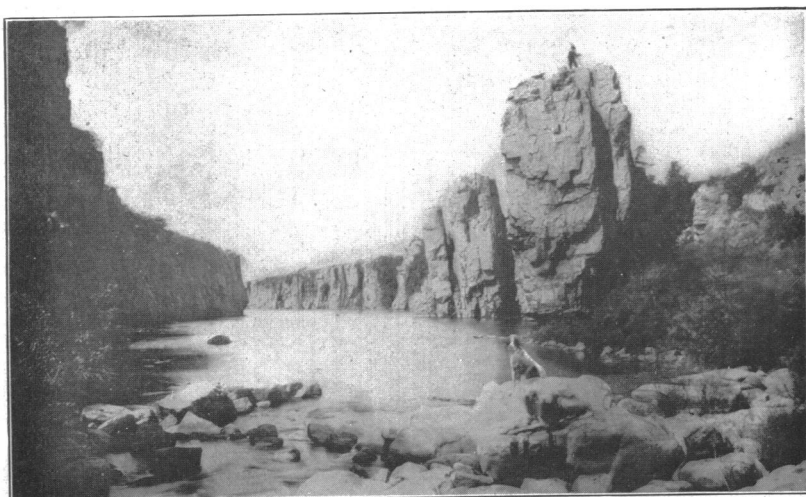


FIG. 4. PALISADES OF THE SIOUX RIVER, rivaling those of the Hudson and the Rhine.

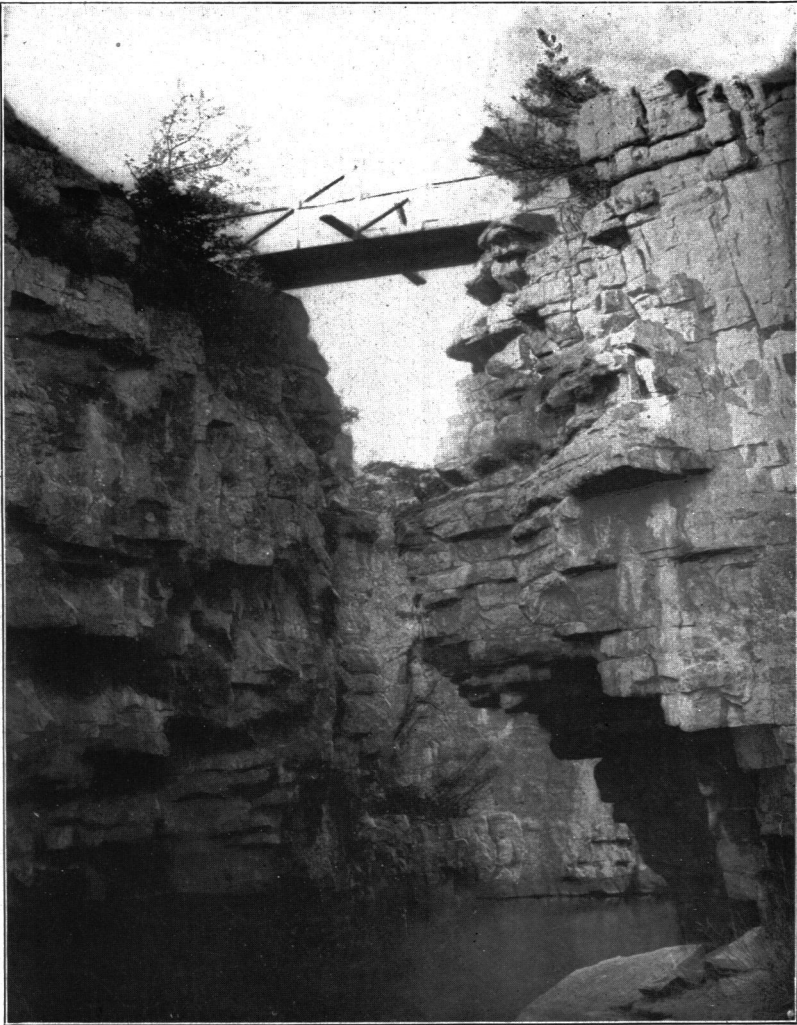


FIG. 5. SPIRIT CANYON; more impassable than the Royal Gorge.

them. Volcanic outbursts have seamed, seared and smelted these formations until often they are almost beyond recognition, but they are not yet destroyed. When rains have failed to wash these rocks away or the rivers have been unable to wear them down, the sea has time and again cut into them or carried them hundreds of fathoms deep, yet they have reared themselves again above the surface of the engulfing waters. Heat of sun and chill of ice have alternately contended in flaking off the rock surface; still they have ever presented new faces to these insidious attempts at their destruction. Winter blasts and the siroccan winds of summer have blown the rock-areas bare and clean as a city



FIG. 6. THE SIOUX FALLS; near which Gitche Manito the Mighty once touched Earth.

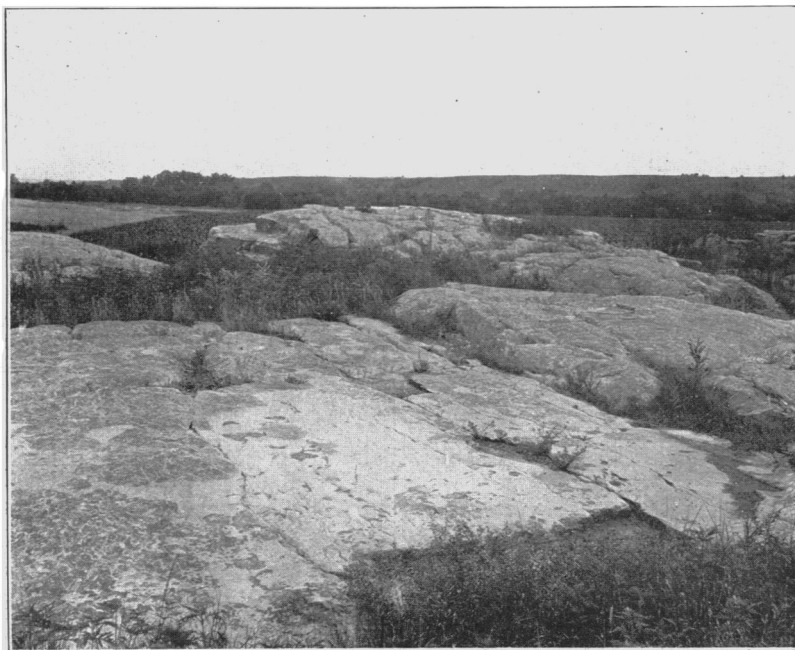


FIG. 7. GLACIAL SCORINGS ON AN ICE-PLANED SURFACE OF SIOUX QUARTZITE.

pavement, and the wind-blown sands and dusts have rounded off all corners and polished all surfaces until the hard vitreous blocks appear as if fused in a furnace, without seemingly making any marked impression. Continental glaciers have repeatedly passed over the region, planing off the glassy masses as a joiner does his beam of wood, and deeply grooving the smoothed facets as by some giant graver. Compression and arching of the earth's crust have uplifted the country into mountains, but they have signally failed to destroy the rocks.



FIG. 8. FAMOUS PIPESTONE QUARRY; for fifty centuries the calumet has been the symbol of universal peace.

The sudden appearance and rapid decline of the Siouan mountains on the mid-continental horizon are incidents of the Mesozoic age of geologic history. Brief, brilliant, almost pathetic are the succession of chief events. The main uplifting took place during the Triassic period. In the succeeding Jurassic and Comanchan times all of the ranges were completely razed to the present plains-level. During Cretacic time the waters of the ocean again rolled unbrokenly over the old base-leveled region, and the bared foundations of the former mountains formed the bottom of the broad epi-continental sea. No great orogenic uplift was ever more rapidly or more completely obliterated. It is one of the marvelous episodes in the long history of the North American land contest.

In still another way the Siouan area is quite notable—perhaps the most remarkable spot of our country. It is one of the completest of outdoor laboratories for geological instruction. With an areal extent scarcely larger than that of some of our larger cities it is a unique study-ground. It is a veritable geologic *multum in parvo*. In this circumscribed district is represented every known category of the geological agencies. The whole panorama of geological science is spread out before one's eyes. Apt illustration abounds of the major phenomena pertaining to the origin, structure and modification of the earth's crust.

The Siouan area is a locality where the cardinal principles of earth science may be best taught by example, and in the least possible period. In a week's time the entire list of principal processes and products may be passed in review in the field. In going to and from this spot another week's time permits examination of the most complete stratigraphic section of the continent and a review of the evolution of life generally. As the culmination of a year's study of geological science indoors this place is well worth a visit by every college student and teacher in geology. It is, in fact, the most typical, most compact, and illuminating area yet revealed wherein students may perform in a little while extensive geologic field-work of a most practical kind. It is here that the outlines of field-geology are acquired at a glance. The foundations are here quickly laid for all the broader and subsequent geologic excursions into the farthestmost points of earth.

The realm of the ancient Siouan mountains is also famous in poetry and Indian lore. Principal scenes of Longfellow's "Song of Hiawatha" are laid here, although when he wrote the epic it is not probable that the poet had ever been nearer the place than the Cambridge gardens on the shores of Back bay.

In the unwritten annals of the Sioux Indians, who once roamed over a large part of the continental interior, the Des Moines river was known as the Inyan-Sha-Sha-Watpa, literally, "Stone-red-red river," or the Redstone river. This Indian name has peculiar significance. When European eyes first beheld it and for a period of more than two centuries thereafter this noble stream was the only all-water route in all the land by which without getting out of his boat Indian and fur-trader could traverse the continent from the Arctic Ocean to the Gulf of Mexico.

The headwaters of the Des Moines River, or Inyan-Sha-Sha-Watpa, are in the red quartzite district of the old Siouan mountains; but the red stone is the more famous catlinite found associated—the much-sought stone from which the calumet or peace-pipe was wrought. From the pipestone ledges of the broad prairies spread peace on earth and good will towards men to the farthestmost limits of the continent, to

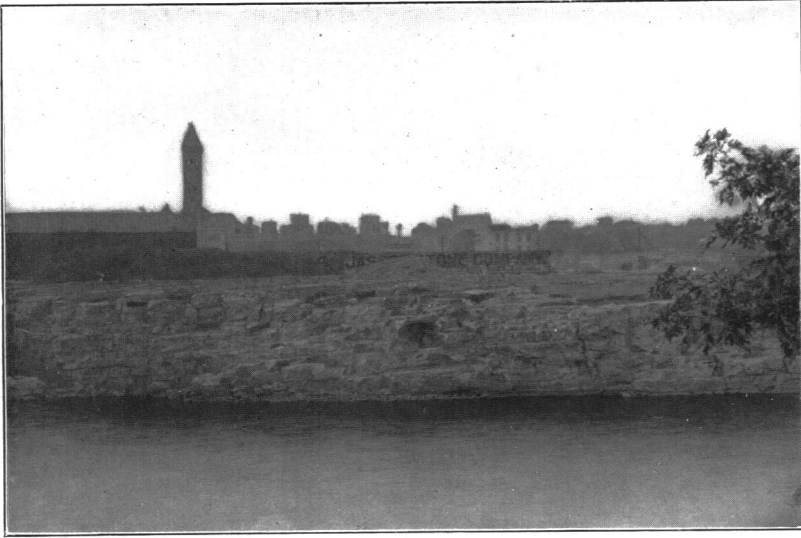


FIG. 9. JUNCTAPOSITION OF OLDEST AND YOUNGEST ROCKS OF EARTH.

the remotest corner of the Indian world. Forty centuries before the Nazarene appeared on earth this spot was solemnly consecrated to the cause of world-wide peace. Peace at once reigned among warring nations wherever the smallest fragment of this red rock was carried. The redstone calumet was the most potent power in the adjudication of international disputes that ever came into the hands of man. It would have been most fitting had the great Temple of The Hague been erected over the quarry from which this magic stone is obtained. It is yet left to us to rear on this spot some noble shaft to point out by simple symbol the highway to universal peace.